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IS 9980 (1988): Guidelines for field performance and haulage tests of power tillers [FAD 11: Agricultural Tractors and Power Tillers]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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*Indian Standard***GUIDELINES FOR
FIELD PERFORMANCE AND HAULAGE
TESTS OF POWER TILLERS***(First Revision)*

1. Scope -- Covers the guidelines for conducting field performance and haulage test of power tillers.

2. Field Performance**2.1 General**

2.1.1 A range of implements, matched to the power tiller, required for operations given under 2.1.2 should be supplied by the applicant. The tests shall be conducted with these implements. If the supply of matching implements has not been made by the applicant, the test shall be performed with those implements which are available at the testing station and as mutually agreed upon by the applicant and the testing station.

2.1.2 The field operations shall consist of following:

a) *Dry land operation*

- 1) Ploughing with mouldboard plough/disc plough,
- 2) Tilling with harrow/cultivator,
- 3) Tilling with rotary tiller, and
- 4) Any other (to be specified by the manufacturer).

b) *Wet land operation*c) *Stationary operations*, if recommended by the manufacturer.

2.1.3 In case any of the operations mentioned in 2.1.2 [a (1, 2, 3) and b] are not recommended, the same shall be declared by the applicant.

2.2 Selection of Land and Preparation of Power Tiller for Tests

2.2.1 Selection of land — The land selected for tests shall preferably be agricultural land on which a crop was harvested within the last one year. The field operation should be made, as far as possible, in test plots where furrow length of a minimum of 50 m would be available. In case of puddling test, the furrow length may be a minimum of 25 m. The plot selected for ploughing, after the harvest of the last crop, should not be given any previous tillage operations. If tilled, it should have a well-settled and reasonably compact soil. The surface should be reasonably level. The condition of the plot shall be checked and reported in accordance with Appendix A.

2.2.2 Preparation of power tiller for tests

2.2.2.1 The power tiller should be fitted with accessories in accordance with the manufacturer's/applicant's recommendations. The servicing and maintenance shall be carried out in accordance with the schedule prescribed by the manufacturer/applicant in the printed literature.

2.2.2.2 The power tiller shall be fitted with ballasts as recommended by the manufacturer/applicant in his sale/instruction manual. In case of pneumatic tyres, it shall be inflated according to the recommendations of the manufacturer for field work.

2.2.2.3 At the beginning of the test, the height of the tyre tread bars or lugs of steel wheels measured at the central line of the tyre/steel wheel shall be at least 65 percent of their height, when new.

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2.3 Field Operation

2.3.1 Field operations with each implement (*see 2.1.2*) shall be carried out for a duration of at least 25 hours. The total duration of field operations with different implements during initial commercial and batch testing of the power tiller, shall be 150 and 75 h, respectively.

2.3.2 The operations except puddling shall be carried out in fields having soil moisture generally required for the type of operation. The soil moisture range for tillage operations for different soils is given below for guidance:

<i>Soil Type</i>	<i>Moisture, Percent (Wet Basis)</i>
Fine sand	Up to 5
Sandy loam	2 to 8
Silt loam	5 to 8
Clay loam	6 to 12
Clay	6 to 12

2.3.2.1 The moisture content shall be determined as stipulated in IS : 2720 (Part 2)-1973 'Method of test of soils: Part 2 Determination of water content (*second revision*)'.

2.3.3 The gear selected shall be one in which satisfactory and safe operation is attained. The gear selected for the operations shall be maintained during the test except at head-land. The limiting factor for the speed should be such that the wheel slip shall be within 20 percent.

2.3.4 The throttle setting for a particular operation shall be in accordance with the manufacturer's/applicant's recommendation. The initial throttle setting shall not be disturbed during the operation with particular implement. However, the setting may be reduced at head-land. A device to restrict the increase in position over the pre-set value may be mounted at the throttle during the operation and such device shall be supplied by the manufacturer/applicant.

2.3.5 For puddling operation, the field should have an average initial water depth of at least 100 mm. Operational speed should be so selected as to obtain proper tilth taking into account the manufacturer's/applicant's recommendations.

2.3.6 During and after the operation, the data/observations shall be recorded in accordance with Appendix A. In case of puddling test, the ingress of water and mud in critical components and assemblies of the power tiller shall be reported. Lubricating oil and coolant (water) consumption shall be measured after the completion of all operations.

2.3.7 Stationary operation — If recommended by the applicant, the power tillers shall be operated for running a centrifugal pump and sprayer. The test with other machines may be conducted by the testing station on the request of the applicant. The data shall be recorded in Appendix B.

3 Haulage Test

3.1 The power tiller shall be tested for haulage with a trailer of the capacity recommended by the manufacturer/applicant.

3.2 The haulage test shall be conducted on a level road/track. The short distance of track may have gradient not exceeding 10 percent.

3.3 The power tiller shall be ballasted in accordance with the recommendation of the manufacturer/applicant. In case of pneumatic tyres, the inflation pressure shall be maintained as recommended by the manufacturer for road work.

3.4 The test consisting of equal test run in both the directions shall be conducted under identical conditions, and range and average of test observations shall be reported. The total distance covered in both the directions of one test run shall be up to 50 km. During the initial commercial testing, 3 test runs and during batch testing, only one test run would be covered.

3.5 The gears selected be appropriate to the satisfactory and safe operation. The speed can be reduced by reducing the engine speed as and when necessary while conducting the test.

3.6 The observations/data shall be recorded according to Appendix C.

APPENDIX A

(*Clauses 2.2.1 and 2.3.6*)

DATA SHEET FOR RECORDING FIELD OPERATION TEST DATA

1. Site of Test Plot
2. Size of Plot
 - a) Length, m
 - b) Width, m
3. Field Conditions:
 - a) Type of soil (*see* IS : 7926-1975 'Classification of soil for testing of agricultural machinery';
 - b) Levelness of field and slope, percent;
 - c) Last crop grown;
 - d) Details of tillage operations, if any, after the harvest of last crop;
 - e) Types of weeds and intensity;
 - f) Soil moisture, percent, in case of puddling test (depth of water); mm
 - g) Bulk density of soil;
 - h) Shear strength of soil (by using a 75 mm vane shear meter) and cone index;
 - j) Any other field conditions influencing power tiller performance.
4. Field Operation Data:
 - a) Gear selected for
 - 1) Power tiller
 - 2) Rotavator
 - b) Engine speed, rev/min
 - 1) At no load
 - 2) On load
 - c) Type of operation (data for different operations to be recorded separately)
 - 1) Dry land operation
 - 2) Wet land operation
 - d) Width of head land and method of ploughing/tilling
 - e) Average operating speed, km/h
 - f) Average width and depth, m
 - 1) Width
 - 2) Depth
 - g) Average draft of implement, kN
 - h) Average wheel slip, percent
 - j) Average wheel sinkage during puddling operation, mm
 - k) Total duration of test, h
 - m) Stoppages and reasons for stoppage
 - n) Total time for stoppage, h
 - p) Net duration of work, h
 - q) Total area covered, ha
 - r) Time required, h/ha
 - s) Area covered, ha/h

- t) Fuel consumed, l/h and l/ha
- u) Lubricating oil consumption, ml/h
- w) Coolant (water) consumption, ml/h
- x) Ambient temperature, °C
- y) Observations, after puddling test, for entry of water and dust/mud in the following components/assemblies:
 - 1) Lubricating oil in engine sump and transmission
 - 2) Brake assembly
 - 3) Clutch assembly
 - 4) Axle assembly
 - 5) Electrical components
- z) General observations:
 - 1) Type and size of implements used
 - 2) Point of hitch and its height (in case of trailed implement)
 - 3) Ease of steering
 - 4) Unusual noise and vibration, if any, observed during operation

A P P E N D I X B

(Clause 2.3.7)

PROFORMA FOR RECORDING STATIONARY OPERATION DATA

- 1. Equipment Used:
 - a) Sprayer
 - b) Pump
 - c) Any other
- 2. Sizes of Equipment
- 3. Mounting Details with Power Tiller
- 4. Discharge Rate of Pump/Sprayer at Pressure....., l/min
- 5. Ease of Handling
- 6. Suitability of Power Tiller (Adequacy of Power, Fitment and Safety of Use)
- 7. Any Other Observation

A P P E N D I X C

(Clause 3.6)

DATA SHEET FOR HAULAGE TEST

- 1. Trailer Details:
 - a) Brief specification of trailer used
 - b) Make and model
 - c) Type
 - d) Size of platform
 - e) Unladen mass of the trailer, t
 - f) Gross mass of the trailer, t

- g) Distance between the centre of power tiller wheel and the centre of the trailer wheel, mm
- h) Tyre size and inflation pressure
- j) Height of hitch above ground level, mm

2. Power Tiller Details:

- a) Type, size and inflation pressure (in case of pneumatic tyre) of power tiller wheel
- b) Ballasting of the power tiller
- c) Wheel track, mm
- d) Height of hitch above ground level, mm
- e) Mass of power tiller, kg

3. Test Results:

- a) Date of test
- b) Total distance travelled, km
- c) Total duration of test, h
- d) Stoppage and reason for stoppage
- e) Total stoppage time, h
- f) Net duration of run, h
- g) Average speed of travel, km/h
- h) Fuel consumption
 - 1) Total, l
 - 2) Hourly, l/h
 - 3) Specific, l/km/t
- j) Distance travelled per litre, km
- k) General observations
 - 1) Effectiveness of brakes
 - 2) Manoeuvrability of power tiller-trailer combination

EXPLANATORY NOTE

This standard was first published in 1981. Based on the experience gained in the use of this standard by the Central Farm Machinery Training and Testing Institute, Budni, a need was felt to revise it.

This standard is based on the procedure being followed at the Central Farm Machinery Training and Testing Institute (Ministry of Agriculture), Budni. It is, however, recommended that the test results obtained under different field conditions shall not be compared for evaluating the field performance of power tillers.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960 'Rules for rounding off numerical values (revised)'.